

JUL 2 8 1998

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): James T. Bachmann

Serial No.: 09/033,901

Examiner: NOT ASSIGNED

Filing Date: 02/28/98

Group Art Unit: 2774

Title: Method For Showing The Execution Trail Of Objects In A Graphical Programming Language

ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

TRANSMITTAL LETTER FOR SUBMITTAL OF MISSING PARTS

Sir:

This is in response to a Notice to File Missing Parts of Application under 37 CFR 1.53(f) mailed on 05/27/98. Enclosed is a copy of said Notice and the following documents and fees to complete the filing requirements of the above-identified application.

(X) Executed Declaration and Power of Attorney. The above-identified application is the same application which the inventor executed by signing the enclosed declaration.

() Statutory basic filing fee () Utility \$790.00 () Design \$330.00

() Additional claim fees of \$

(X) Missing Parts Surcharge \$130.00

() A Petition for Extension of Time for reply to Notice of Missing Parts is attached.

() one month \$110.00
() two months \$400.00
() three months \$950.00
() four months \$1510.00

Please charge to Deposit Account **08-2025** the sum of \$130.00. At any time during the pendency of this application, please charge any fees required or credit any overpayment to Deposit Account **08-2025** pursuant to 37 CFR 1.25.

(X) A duplicate copy of this transmittal letter is enclosed.

07/23/1998 TTUBBS 00000044 082025 09033901

01 FC:105 130.00 CH

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

Date of Deposit: July 15, 1998

Typed Name: Lanae L. Schlitt

Signature: 

Respectfully submitted,

James T. Bachmann

By 

Patrick J. Murphy

Attorney/Agent for Applicant(s)
Reg. No. 36,618

Date: 7/15/98

Telephone No.: (970) 898-6968

IN THE U.S. PATENT AND TRADEMARK OFFICE
Patent Application Transmittal LetterASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

Sir:

Transmitted herewith for filing under 37 CFR 1.53(b) is a(n): ☒ Utility ☐ Design☒ original patent application,☐ continuation-in-part application

INVENTOR(S): James T. Bachmann

TITLE: Method For Showing the Execution Trail Of Objects In A Graphical Programming Language

Enclosed are:

☒ The Declaration and Power of Attorney. ☐ signed ☒ unsigned or partially signed☒ 3 sheets of drawings (one set)☐ Information Disclosure Statement and Form PTO-1449 ☐ Associate Power of Attorney☐ Priority document(s) ☐ (Other) (fee \$)

CLAIMS AS FILED BY OTHER THAN A SMALL ENTITY				
(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) TOTALS
TOTAL CLAIMS	1 — 20	0	X \$ 22	\$ 0
INDEPENDENT CLAIMS	1 — 3	0	X \$ 82	\$ 0
ANY MULTIPLE DEPENDENT CLAIMS	0		\$ 270	\$ 0
BASIC FEE: Design (\$330.00); Utility (\$790.00)				\$ 790
TOTAL FILING FEE				\$ 790
OTHER FEES				\$ 0
TOTAL CHARGES TO DEPOSIT ACCOUNT				\$ 790

Charge \$ 790 to Deposit Account 08-2025. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16, 1.17, 1.19, 1.20 and 1.21. A duplicate copy of this sheet is enclosed.

"Express Mail" label no. EL077999787US

Date of Deposit Feb. 28, 1998

I hereby certify that this is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

By Patrick J. Murphy
Typed Name: Patrick J. Murphy

Respectfully submitted,

James T. Bachmann

By Patrick J. Murphy

Patrick J. Murphy

Attorney/Agent for Applicant(s)

Reg. No. 36,618

Date: Feb. 28, 1998

Telephone No.: (970) 898-6968

**DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION**ATTORNEY DOCKET NO. 10980710-1

As a below named inventor, I hereby declare that:

My residence/post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Method For Showing The Execution Trail Of Objects In A Graphical Programming Language

the specification of which is attached hereto unless the following box is checked:

() was filed on _____ as US Application Serial No. or PCT International Application
Number _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understood the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose all information which is material to patentability as defined in 37 CFR 1.56.

Foreign Application(s) and/or Claim of Foreign Priority

I hereby claim foreign priority benefits under Title 35, United States Code Section 119 of any foreign application(s) for patent or inventor(s) certificate listed below and have also identified below any foreign application for patent or inventor(s) certificate having a filing date before that of the application on which priority is claimed:

COUNTRY	APPLICATION NUMBER	DATE FILED	PRIORITY CLAIMED UNDER 35 U.S.C. 119
N/A			YES: _____ NO: _____
			YES: _____ NO: _____

Provisional Application

I hereby claim the benefit under Title 35, United States Code Section 119(e) of any United States provisional application(s) listed below:

APPLICATION SERIAL NUMBER	FILING DATE
N/A	

U. S. Priority Claim

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

APPLICATION SERIAL NUMBER	FILING DATE	STATUS (patented/pending/abandoned)
N/A		

POWER OF ATTORNEY:

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) listed below to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Jeffery B. Fromm**Patrick J. Murphy****Jack Lenell****Augustus W. Winfield**Reg. No. **30,558**Reg. No. **36,618**Reg. No. **36,199**Reg. No. **34,046**

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IP Administration
Legal Department, 20BN
HEWLETT-PACKARD COMPANY
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Palo Alto, California 94303-0890

Direct Telephone Calls To:

Patrick J. Murphy
(970) 898-6968

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Inventor: **James T. Bachmann**Citizenship: **US**Residence: **700 Colony Court, Fort Collins, CO 80526**Post Office Address: **Same as Residence**

Inventor's Signature _____

Date _____

METHOD FOR SHOWING THE EXECUTION TRAIL OF OBJECTS IN A GRAPHICAL PROGRAMMING LANGUAGE

FIELD OF THE INVENTION

5 The present invention relates generally to computer systems and more particularly to a method for showing the execution trail of objects in a graphical programming language.

BACKGROUND OF THE INVENTION

10 Graphical programming languages, like Hewlett-Packard's VEE, are iconic programming systems. Such a system is a "programming-less" environment where programming is performed by employing objects, or icons (i.e., graphical images of functions), together with connecting lines, to form a directed graph and create an iconic network which is representative of a software program. The iconic programming system
15 may be used in a test and measurement system, where several different electronic instruments are connected to test a system or a device. Programming such a system requires instructions to cause the various instruments to perform desired functions in order to operate as a system. When an iconic programming system is used, each instrument will be represented by a graphical icon, and the connections between the instruments are
20 represented by lines between the icons. Programming functions, such as IF-THEN-ELSE statements and FOR loops, can also be represented by icons. By combining programming

icons with instrument icons, a user can create an iconic network related to the operation of the instruments.

Such iconic networks are often large and/or complicated. Debugging these networks is tedious and fraught with pitfalls. Often the user cannot be sure which icons have already executed and which paths the program took. There is a need in the art then for a system that will provide a way for a programmer in an iconic programming system to trace the path a program has taken and to identify which icons have executed while debugging the program.

Various features and components of an iconic programming system are disclosed in U.S. patent number 5,325,481 for METHOD FOR CREATING DYNAMIC USER PANELS IN AN ICONIC PROGRAMMING SYSTEM of Hunt and U.S. patent number 5,261,043 for PROCESSING METHOD FOR AN ICONIC PROGRAMMING SYSTEM of Beethe, each of which is hereby specifically incorporated by reference for all that is disclosed therein.

SUMMARY OF THE INVENTION

The present invention provides a method for showing the execution trail of objects in a graphical programming language. Upon initiation by the user, the method highlights objects that have executed so that, while debugging a program, the user can trace the path a program has taken and identify which icons have executed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a block diagram of a computer system incorporating the present invention.

FIG. 2 shows a representative iconic network.

FIG. 3 shows a flowchart of the method for showing the execution trail of icons according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a block diagram of a computer system 100 incorporating the present invention. A processing unit 110 is connected to system bus 105. The system bus 105 facilitates communications between the processing unit 110 and memory 120, a data storage disk 130 and an input/output interface device 140. The memory stores the software of the present invention as well as all data collected and generated by the present invention. An first area 122 within the memory 120 is set aside for storage of the present method which is described more fully below. A second area 124 within the memory 120 contains the user-defined iconic network. The input/output interface device 140 controls data communications between the bus 105 and a display 142, a keyboard 144 and a point-and-click input device 146. An instrument bus 150 is used to allow the iconic programming system to communicate with test instruments. In a preferred embodiment, the instrument bus 150 is an IEEE-488 bus.

FIG. 2 shows a representative iconic network. Display screen 200 contains a first numeric input icon 210 which is used to define a start point and a second numeric input icon 212 which is used to define the number of points to be displayed in a view screen 220. The start point is sent over connecting line 201 to view screen 220 to set the starting point of the view screen which displays logic activity of a device under test (not shown), or DUT. The number of points to be displayed are sent over connecting line 202 to a count icon 214. The count icon 214 will count from zero to the number of points defined in icon 212. Each time the count icon 214 increments the count value by one, a signal will be sent over connecting line 203 to the view screen 220 which in turn updates the logic activity signal with an additional data point.

Each time the view screen 220 updates, a signal is sent over connecting line 204 to IF-THEN-ELSE function icon 230. If A is either equal to zero or less than 1, then function icon B1 is executed; else, if A equals 1, then function icon B2 is executed.

Each icon in FIG. 2 has a frame that is highlightable; that is, the lines that comprise the rectangular box that frames each icon can be set to be a predetermined color which in effect highlights the icon on the display screen.

FIG. 3 shows a flow diagram of the present invention. Block 310 sets the trace mode of the present method to "on." In a preferred embodiment, this is accomplished by the end user who would click the mouse on a toolbar button to enable the present method. The "for loop" indicated by block 320 then operates to examine each icon in the display

screen to determine if the icon was executed (decisional block 330). If the icon has not been executed, no action is taken. If decisional block 330 determines that the icon has been executed, control is passed to block 340 to set a TRACE_FLAG to "on."

5 After each icon is processed, block 350 examines each icon that has had its TRACE_FLAG set to on; for those icons that have TRACE_FLAG set equal to on, block 360 highlights the frame.

10 Referring back to FIG. 2 for illustrative purposes, as flow moves through each icon, the TRACE_FLAG for each icon that is executed is set equal to "on." For looping functions (e.g., icons 214 and 230), the present method will set highlight the last iteration of the of the loop. So, for example, if the "else" clause of the IF-THEN-ELSE function icon 230 executed during the last iteration of the loop, then function B2 234 will be highlighted, and not function B1 232.

15 While the present invention has been illustrated and described in connection with the preferred embodiments, it is not to be limited to the particular structures shown. It should be understood by those skilled in the art that various changes and modifications may be made within the purview of the appended claims without departing from the true scope and spirit of the invention in its broader aspects.

What is claimed is:

1. In an iconic programming system, wherein the iconic programming system contains an existing network of connected icons, a computer-implemented method for tracing the execution of icons, the method comprising the steps of:

- 5
- (1) setting a flag in each icon as the icon is executed; and
 - (2) highlighting the icon if the flag has been set.

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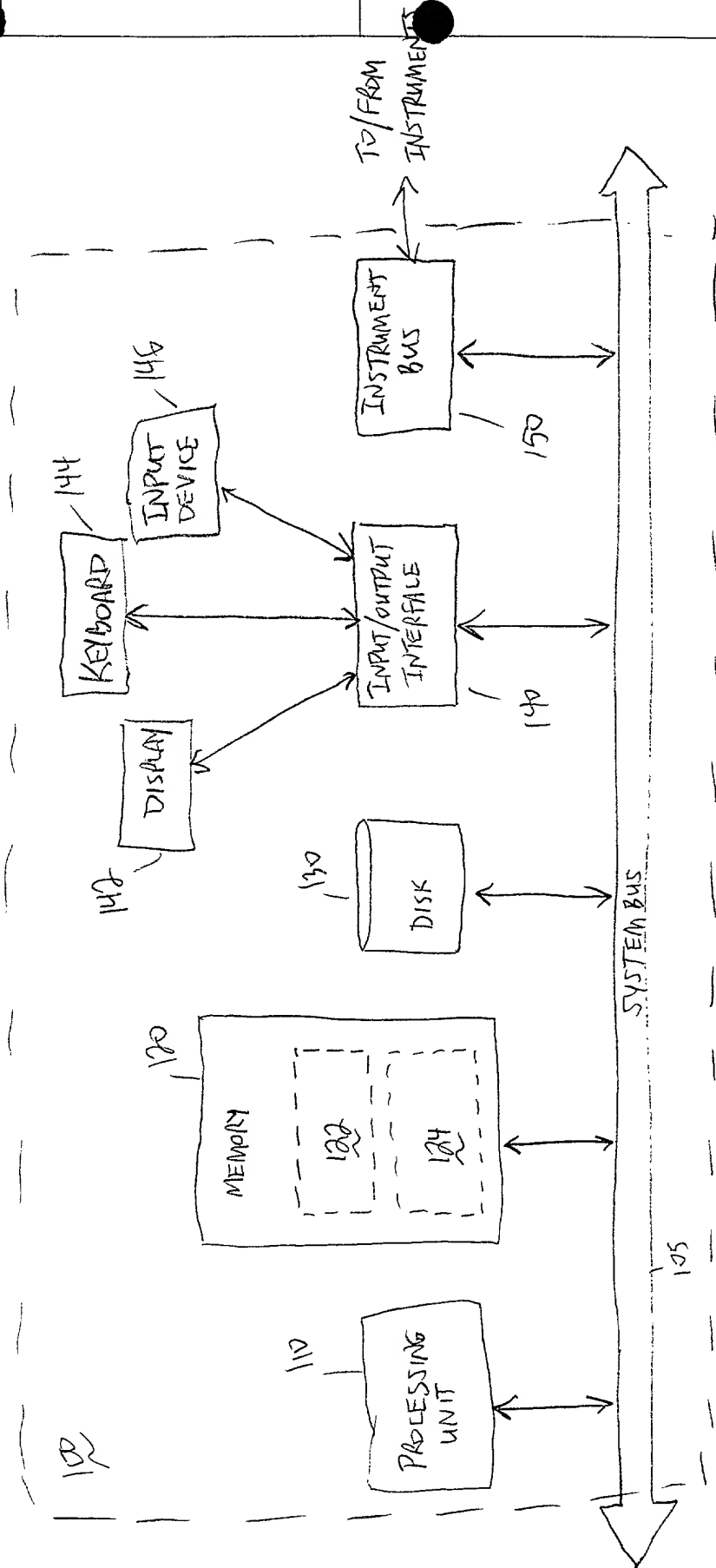


FIG. 1

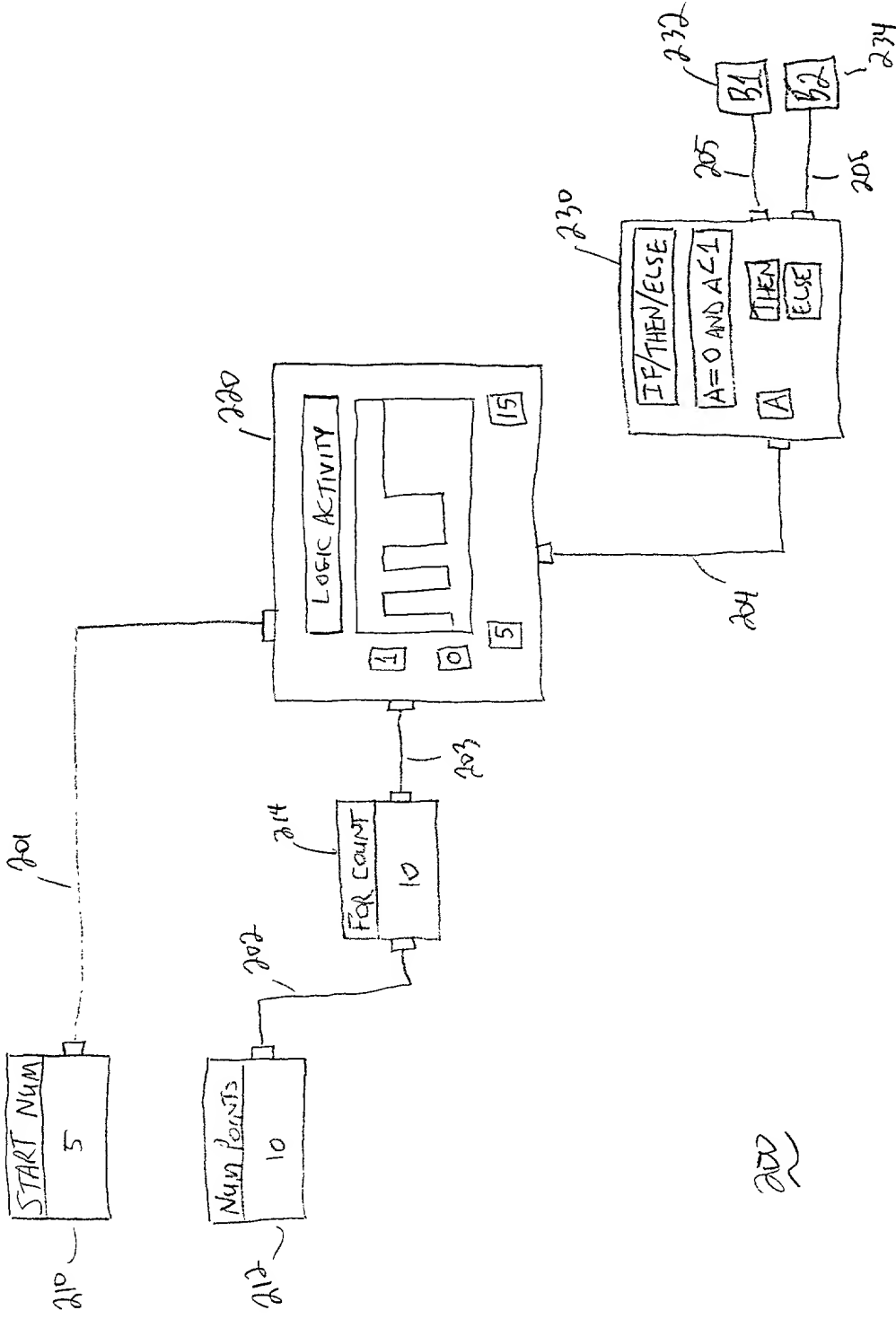


FIG. 2

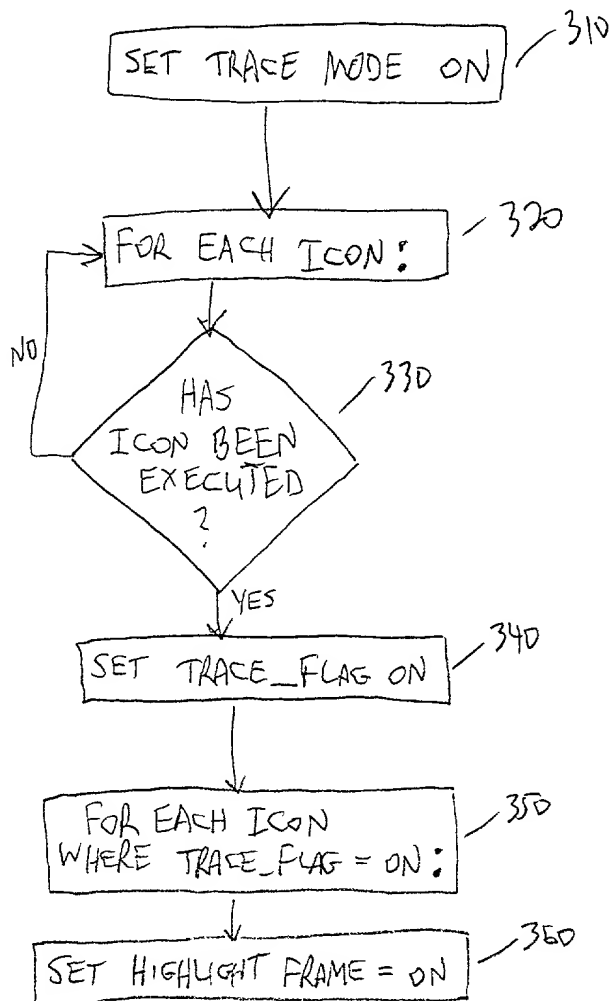


FIG. 3

DECLARATION AND POWER OF ATTORNEY
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ATTORNEY DOCKET NO. 10980710-1

As a below named inventor, I hereby declare that:

My residence/post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

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I hereby state that I have reviewed and understood the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose all information which is material to patentability as defined in 37 CFR 1.56.

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Full Name of Inventor: James T. BachmannCitizenship: USResidence: 700 Colony Court, Fort Collins, CO 80526Post Office Address: Same as Residence

Inventor's Signature

Date